

Command and Control Workstation (CCWS) Phase 1 Thread Atlas DP1

Checkout and Launch Control System (CLCS)

84K00303-018

Approval:

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Supporting Document Note:

Acronyms and definitions of many common CLCS terms may be found in the following documents: CLCS Acronyms 84K00240 and CLCS Project Glossary 84K00250.

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1. INTRODUCTION

1.1 CCWS PHASE 1 THREAD OVERVIEW.

This thread provides for the integration of and upgrades to the Command and Control Workstation to support the total user environment. It includes work on user interfaces, integration of the HMP, User Environment Management, and Operation of this platform.

1.2 CCWS PHASE 1 THREAD CONCEPT

The Command and Control Workstation (CCWS) is the software and hardware required to provide test operations personnel the ability to monitor, command and control test article end items, to monitor and control the operational test set hardware and software, *and to provide a simulation interface capability for testing application software and for training operations personnel.*

The CLCS project documentation (SLS and ConOps) have identified 2 subsets of Command and Control Workstations:

1. Operational facility fixed position CCWS (OCR, HMF, SAIL, etc.)
2. *Portable CCWS (laptop or mobile terminal) (also known as Local Acquisition and Control Subsystem (LACS))*

Operation facilities, such as the LCC OCRs and HMF, have a designated floor plan for a fixed layout of the equipment to support test operations, including the CCWS. This carries on in the philosophy of the CCMS operational facilities.

The local control/portable CCWS provides monitoring and command capability for use at the local sites, in the vicinity of the end item(s) under test. This proximity of a CCWS to the end item allows for a consolidation of engineering resources. Support personnel may conduct non-hazardous operations at the location of the end item under test rather than requiring engineering resources both in the OCR and in the vicinity of the test article.

1.2.1 CCWS Software Load

The software load of the CCWS (as of the Thor DP2/3s) consists of the following system and real time control application processes:

- System Viewers CSCI
 - Control Navigation System (CNS) (Thor3.0)
 - System Message Viewer
 - Constraint/Event Viewer
 - System Status Viewer
 - Console Allocation Viewer (new in Atlas)
 - Data Browser Viewer
 - *System Browser (post Atlas)*
 - FD Support
 - FD Details
 - Data Health Viewer
 - PCL Viewer
 - Data Fusion Viewer
 - DMON Viewer
 - Plot Viewer (changed in Thor 3.0)
 - ControlShell™ Menu System (Xterm) (COTS new in Atlas)
 - LiveLink™ GUI (COTS new in Atlas)

- Stethoscope™ GUI (COTS new in Atlas)
 - HCI Manager Program (HMP)
 - Test Application Display Driver (TADD)
- Data Distribution and Processing CSCI
 - Data Distribution
 - DDP Receiver Process
 - DDP Server Process
 - Constraint Management
 - Constraint Cache Receiver
- Command Support CSCI
 - Command Processor GUI
 - Command Scripter GUI
 - Command Management
 - Authentication Service
 - Authentication Server
- System Control CSCI
 - Redundancy Management
 - Subsystem Integrity
 - Computer Integrity
 - Ops Configuration Management
 - Activity Management
 - RTPS System SW Load and Initialization
 - Download Daemon
 - Test Load (Atlas)
 - System & Test Load Verification (Atlas)
- System Services CSCI
 - OS (COTS)
 - Network Services
 - Reliable Messages Process (Atlas)
 - Network Registration Service (NRS) Process
 - Interprocess Communications
 - Corba (COTS)
 - Event Services
 - Event Services Manager Process
 - Event Services LAN Manager Process
 - System Message Services
 - SMS Receive Process
 - Timer Services
 - Local Timer Commands Process
 - Local Monitor Timers Process
 - Timer Services GUI
 - Stopwatch GUI
 - Initialization and Termination Services
 - Autopilot
 - Autopanel
 - Apx
 - Utility Services
 - Logging Services
 - Local Logging Services
 - Access Control / Security

CNS - This process provides the common user interface for the console user to control and monitor their area of responsibility. There is only one CNS process per CCWS. The CNS should be considered an essential process for purposes of Subsystem Integrity to determine the CCWS “go/no go” status. (An important factor in considering this process essential is the virtual PFP function (VCP – Virtual Command Panel) to command EIM sequencers via CORBA calls.) This process is placed into execution during console initiation.

Viewers - The System Message, Constraint/Event, System Status, Data Browser (System Browser), Console Allocation, and the Command Processor (and Command Scripser) all have “hot areas” on the CNS from which a console user may “pop” open the respective user interface window. There is only one of each of these user interface applications per CCWS. All of these user interfaces should be considered non-essential applications for purposes of Subsystem Integrity to determine the CCWS “go/no go” status. CNS initiates these applications.

The Data Element Viewers (FD Details, DMON, PLOT) are manually initiated by the console user via the user interfaces listed above or via “hot areas” on Dynamic Displays. The number of these user interfaces that can be initiated concurrently is unlimited. However, the console user should be aware that console performance degradation could occur as the number of user interfaces concurrently executed increases. These user interfaces should be considered as non-essential applications for purposes of Subsystem Integrity to determine the CCWS “go/no go” status.

HMP - This process provides the console user a “view” into their command and/or monitor area of responsibility. It maintains a “status display” of the CCWS’s assigned user class EIMs’ and executing Dynamic Displays’ status. There is only one HMP per CCWS CRT. The HMP should be considered an essential process for purposes of Subsystem Integrity to determine the CCWS “go/no go” status. This process is placed into execution during console initiation.

Test Application Display Driver (TADD) - This process is responsible for invoking, initiating and providing data to the Test Application Displays. It provides display status for each of the Test Application Displays to the HMP. There is only one TADD per CCWS. The TADD should be considered an essential process for purposes of Subsystem Integrity to determine the CCWS “go/no go” status. This process is placed into execution during console initiation.

Data Distribution - This system service initializes and updates the CVT on the CCWS. The processes associated with this service on the CCWS, the DDP Receiver Process and the DDP Server Process, should be considered essential processes for purposes of Subsystem Integrity to determine the CCWS “go/no go” status. These processes are placed into execution during console initiation. (CNS will monitor the FDs associated with the Data Distribution processes, so that the CNS may maintain its data distribution status flag.)

Constraint Management - This system service maintains the constraint cache on the CCWS. The process associated with this service on the CCWS, the Constraint Cache Receiver, should be considered a non-essential process for purposes of Subsystem Integrity to determine the CCWS “go/no go” status. This process is placed into execution during console initiation.

Command Support - This CSCI authenticates (Authentication Server) and routes manual user commands (Command Management) and viewer commands (Command Processor and Command Scripser) to the CCP from the CCWS. The Authentication Server should be considered an essential process and the Command Management, Command Processor and Command Scripser processes should be considered non-essential processes for purposes of Subsystem Integrity to determine the CCWS “go/no go” status. Command Management and the Authentication Server are placed into execution during console initiation. CNS initiates the Command Processor and Command Scripser (ref. **Viewers** section above).

CCWS Subsystem Integrity - This system process monitors the overall health of the CCWS and reports its status to CCWS System Integrity, residing on the master CCP. There is only one CCWS Subsystem Integrity application per CCWS. The CCWS Subsystem Integrity process should be considered an essential process for

purposes of Subsystem/System Integrity to determine the CCWS “go/no go” mode. This application is placed into execution during console initiation.

Operations Configuration Management - This system service provides the capability to load and configure the CCWSs. It also supports the creation and management of activities within the CLCS. The Activity Management and RTPS System SW Load and Initialization processes are only executed on the Test Set Master CCWS. These processes should be considered as essential processes for purposes of Subsystem Integrity to determine the Test Set Master CCWS “go/no go” mode. The Download Daemon process is executed on every CCWS and should be considered a non-essential process for purposes of Subsystem/System Integrity to determine the CCWS “go/no go” mode during an operational test. However, if the CCWS is involved in load and configuration activities, then the Download Daemon process should be considered an essential process by Subsystem Integrity. These processes should be considered part of the operating system configuration prior to the CCWS being placed into an operational environment.

Network Services - This system service provides the underlying network communications transport on the CCWS. The processes associated with this service on the CCWS should be considered as essential processes for purposes of Subsystem Integrity to determine the CCWS “go/no go” mode. The processes associated with this service are placed into execution during console initiation.

1.2.2 CCWS External Software Interfaces

The CCWS communicates with the Data Distribution Processor (DDP), the Command and Control Processor (CCP), and the Data Recording Processor (DRP) over the Display and Control Network (DCN) and the Ops CM Server and the utility boxes (e.g. printers) over the utility network. The following communications protocols are used for CCWS external communications:

- Application Messaging (AM)
- Reliable Messages (RM)
- IPC Services (uses the Event Services Manager and ES LAN Manager processes)
- Common Object Request Broker Adapter (CORBA)
- Transmission Control Protocol (TCP)
- Unreliable Data Protocol (UDP).

The CCWS receives change data and constraint cache updates from the DDP. The CCWS sends constraint command requests to the DDP Constraint Management Process. The CCWS Subsystem Integrity process sends status updates to and receives commands and System Configuration Table updates from the master CCP System Integrity. System messages are received from and sent to the System Message Services process on the Master CCP. Command Management routes user interface commands (excluding Test Application commands) to the CCP Command Management process. The HCI Manager Program (HMP) communicates with the CCP Manager Program (CMP) for EIM / Sequencer activate and terminate requests. The Test Application Display Driver (TADD) communicates with the CCP End Item Managers / Sequencers for issuing commands and displaying of prompts. The ControlShellTM Menu System is an Xterm connection to the CCP. The ControlShellTM Menu System actually executes on the CCP. It is used for contingency operations to inspect and change the state of a running EIM or sequencer. The LiveLinkTM “read only” GUI allows users to browse the EIM application diagrams and interact with the EIM process to set breakpoints, go to indicated states, etc. The Stethoscope GUI permits real-time plotting of EIM or sequencer internal variables.

The CCWS Log Data process sends data to the DRP for logging to the Shuttle Data Center (SDC). The CCWS Utility Services sends print data to CLCS printers (utility box). The CCWS Access Control & Security (ACS) process sends its access control and audit data to the ACS Server upon request. The Ops CM processes, Activity Management and RTPS System SW Load and Initialization, only execute on the Master CCWS to interface to the Ops CM Server for loading and initializing the test set. The Download Daemon process executes on every CCWS to download the platform processes and tables from the Ops CM Server.

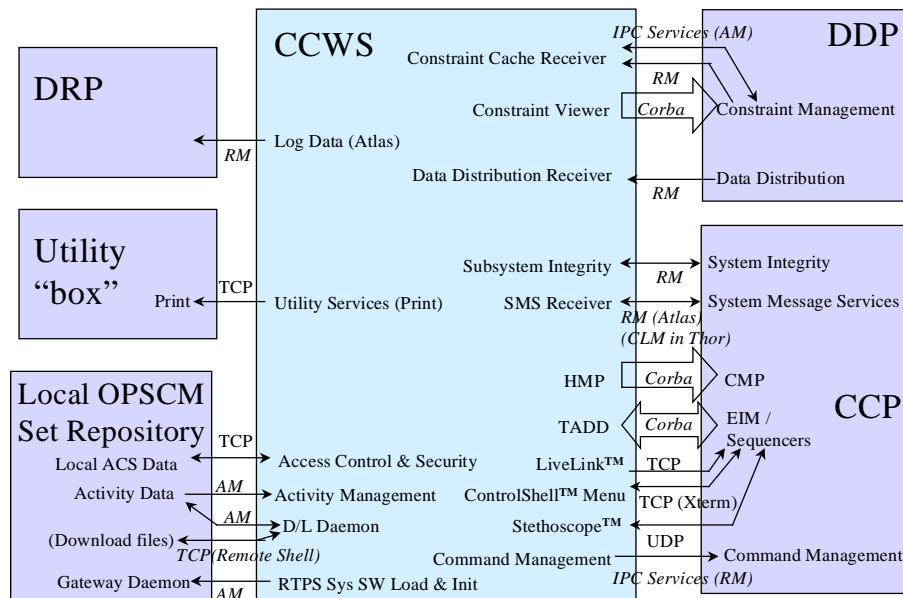


Figure 1.2-1 CCWS External Software Interfaces

1.2.3 CCWS User Interface and Control Processes

This section is left undefined at the present time. An Engineering Review Panel action is currently in work which will affect this section.

However, a new design concept for providing a plot user interface which satisfies both system and application requirements is presented next.

CCWS System applications have a requirement to provide a plot user interface accessible by the user from the CNS. The RTC Applications also have a requirement to provide plotting capabilities within their Test Application Displays (TAD). In order to provide a single plot user interface to the CCWS user community, a SL_GMS™ plot sub-model is used as a common component. The SL-GMS™ plot sub-model contains all the user interface controls and displays required by both the system Plot Viewer and the RTC Application's TADs. The execution functionality of the SL-GMS™ plot sub-model is provided by the Test Application Display Driver process on the CCWS. This requires the system Plot Viewer, during initialization, to connect to the TADD. Any other system user interface may initiate a system Plot Viewer via a request to the CNS. EIM sequencers control the TAD via the TADD plot interface.

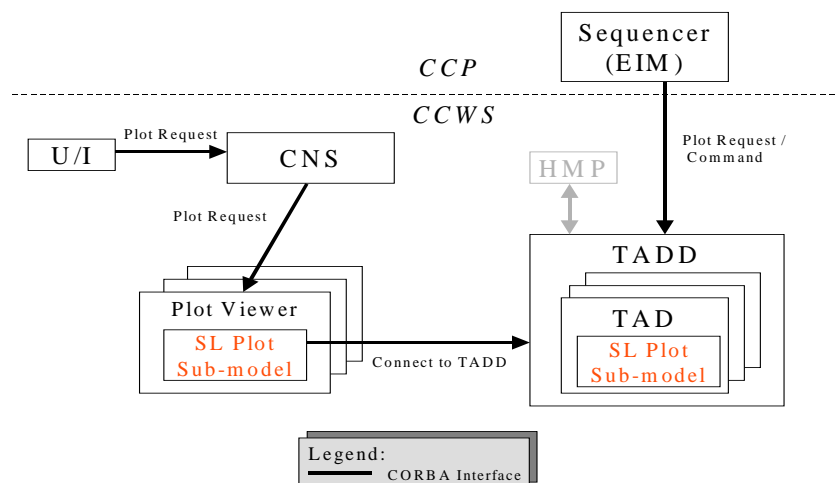


Figure 1.2-2 Plot User Interface Design Concept

1.2.4 CCWS Lower-Level System Processes

Figure 1.2-2 shows the lower-level system processes, their inter-process communications and memory tables used. The smaller internal boxes are used to represent library services linked into the process. (The library service depiction is incomplete at this time.) The Thor DP2/3s were used as the basis for obtaining this information.

The results of current performance analysis obtained to date indicate the need to perform risk mitigation on the CCWS architecture.

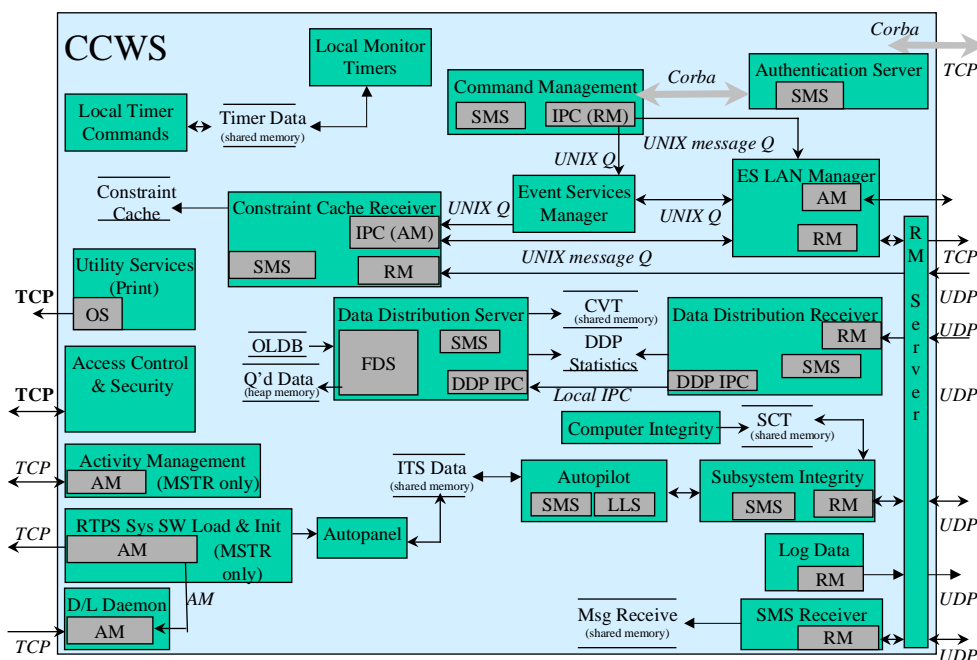


Figure 1.2-3 CCWS Lower-Level System Processes

The CCWS hardware is defined in Section 1.5.

1.3 OPERATIONAL AND FUNCTIONAL OVERVIEW

The CCWS provides either single or dual headed monitors for test engineering personnel to have a means to view the state of their test article and for operations support personnel a means to view the status of the test set hardware and software.

1.3.1 Window Management and Navigation

The CCWS window navigation and management will expand upon the concept provided by Robert Pierce on 10/20/1997.

The Control Navigation System (CNS) provides a fixed banner along three edges of the primary monitor and along two edges of the secondary monitor. The HCI Manager Program (HMP) is directly adjacent to the CNS along the left side of the primary monitor and the right side of the secondary monitor. The CNS provides test set summary information, user interface display control access and the Virtual Control Panel user interface. The HMP provides test application set summary information and access to test application displays and sequencers. The CNS and HMP are both designed to occupy as little monitor real estate as possible. The CNS and HMP cannot be overlaid. Figure 1.3-1 show the general positioning of the primary and secondary monitors.

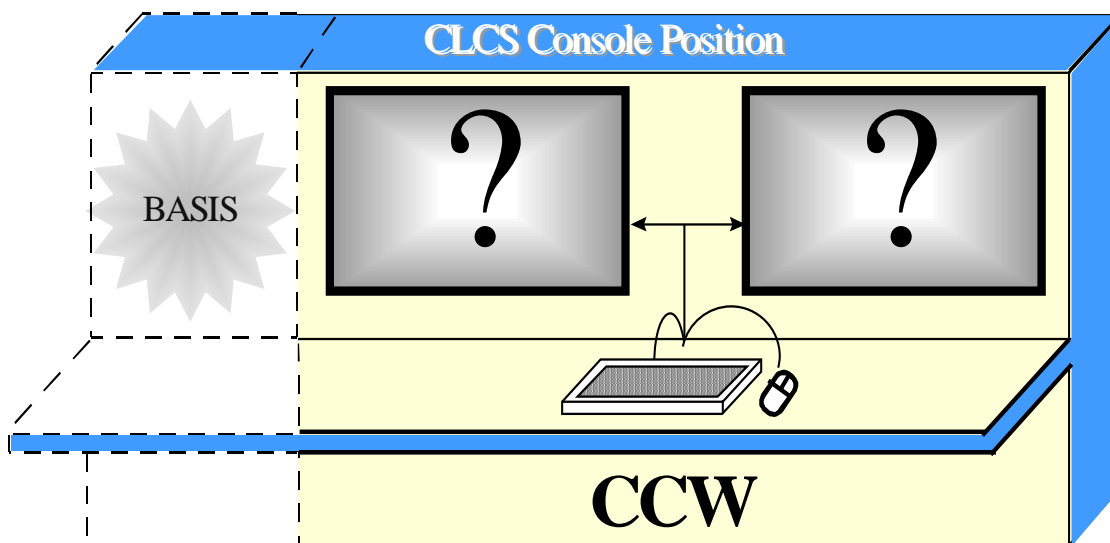


Figure 1.3-1 Layout of the Primary and Secondary CCWS Monitors

On the primary CCWS monitor, the top most banner of the CNS provides test set summary information, such as TCID, JTOY, CDT, vehicle-mission id, vehicle-test set location, hardware-simulation identifier, receiving data distribution indicator, etc. The upper left most corner of the CNS displays the CCWS assigned user class(es) indicating control authentication. This information is displayed within the fixed real estate of this CNS edge. The left-most side of the CNS banner provides summary gateway status and access to common-use system level user interface displays. User interface displays spawned from this CNS edge are displayed in a standard location on the secondary CCWS monitor. Adjacent to this edge of the CNS is the HMP. The HMP provides quick access to the test application displays and sequencers for the CCWS assigned application set (user class) and summary status information on the associated end item application software. All test application displays and sequencers initiated from the HMP on the primary CCWS monitor are displayed on the primary monitor. At the bottom edge of the primary CCWS monitor is the fixed real estate for the Virtual Control Panel. The Virtual Control Panel can be iconed to the left-most bottom corner of the CNS or opened across the bottom fixed area of the CNS

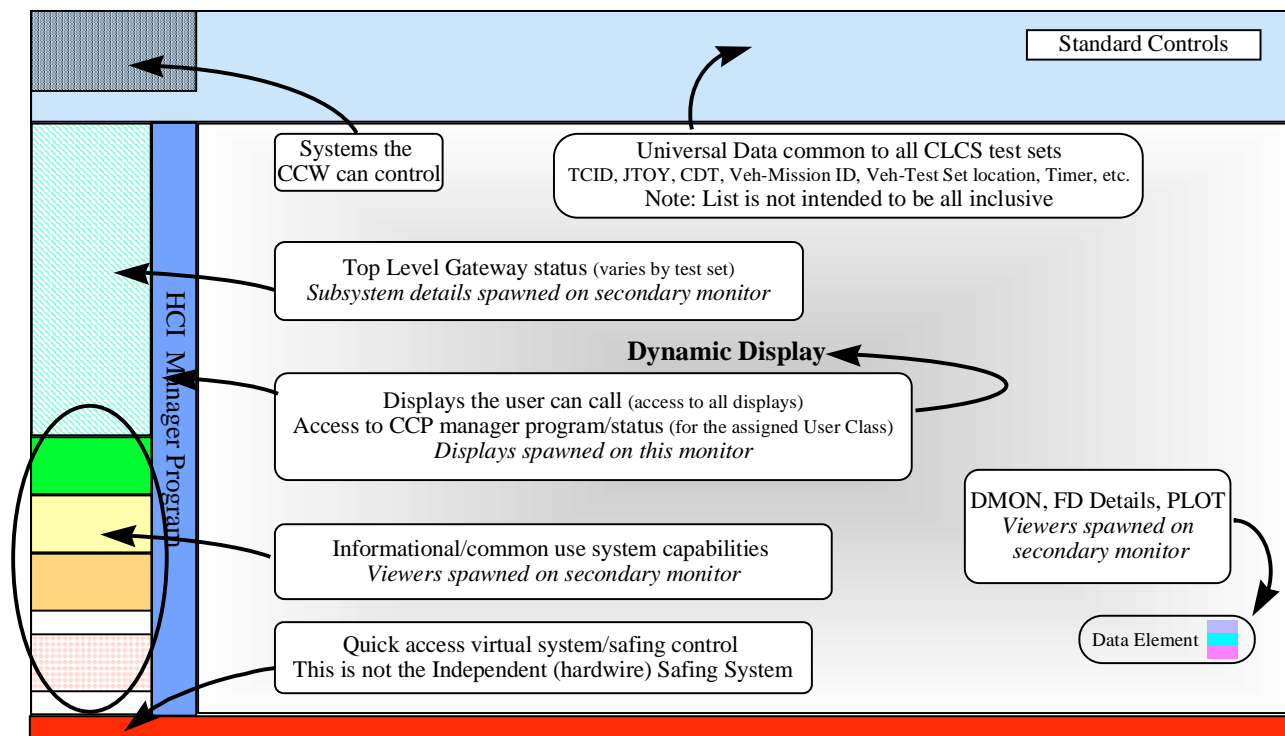


Figure 1.3-2 CNS/HMP Primary Monitor Concept

The area designated for the Virtual Control Panel (VCP) display may be used by other displays. However, when the VCP is expanded, it remains the foremost window.

The secondary CCWS monitor contains a reduced CNS occupying monitor real estate on the right most and bottom edges only. The right most edge of the CNS contains the user class(es) assignment, limited test set summary information, and access to the system level user interface displays. Viewers spawned from the secondary CCWS CNS are displayed on the secondary CCWS monitor. The HMP is also adjacent to the CNS on this monitor. Test application displays and sequencers initiated from this HMP are displayed on the secondary CCWS monitor. As with the primary CCWS monitor, the Virtual Control Panel is accessible at the bottom edge of the CNS on the secondary CCWS monitor and may not be overlaid when it is expanded.

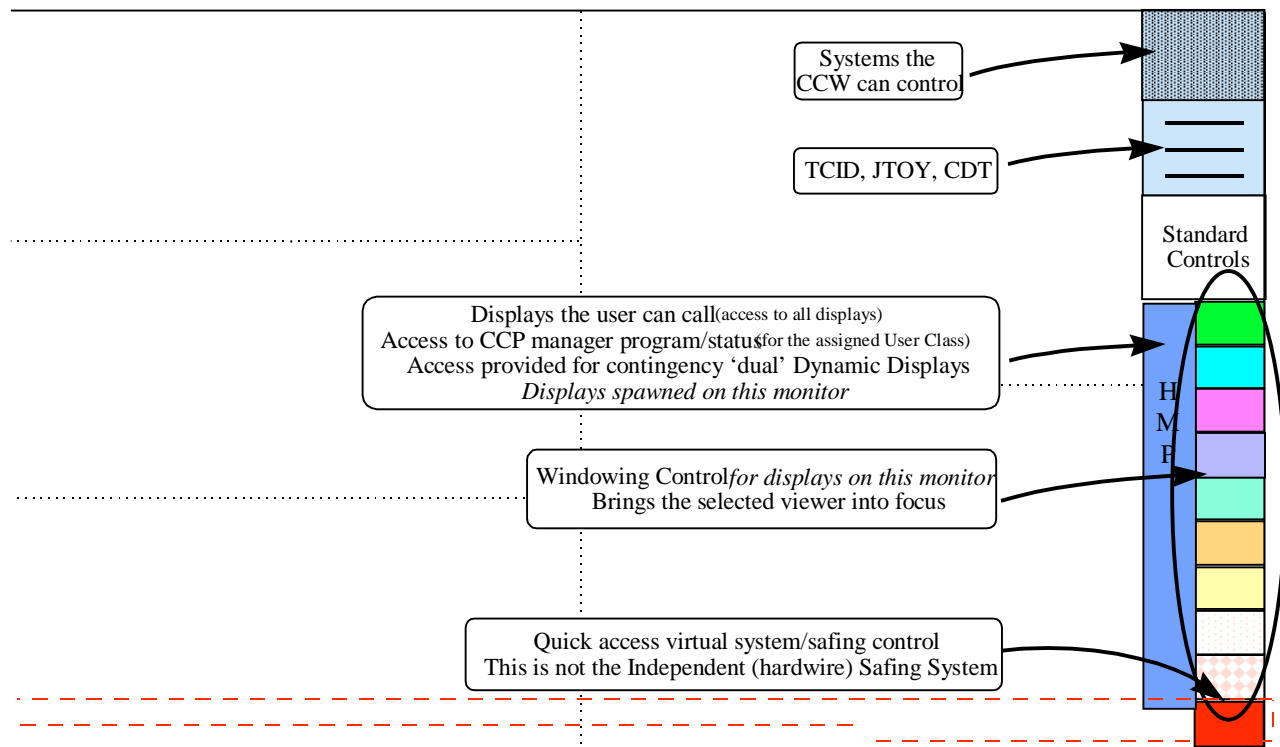


Figure 1.3-3 CNS/HMP Secondary Monitor Concept

The Virtual Control Panel display of the CNS is a “window template” in which the End Item Manager applications define the user control functionality. When a user class is assigned to the CCWS, the CNS VCP user interface accesses the VCP End Item Component assignment configuration file for all VCP displays associated with the user class. For example, the HMF EIMs will provide a VCP user control functionality for each of the HMF bays. This configuration file is built and maintained by the RTC Applications group and becomes part of the TCID load. The CNS VCP uses the first VCP EIC Assignment file entry user class match as the default VCP EIC controller. It then requests the End Item Manager:VCP End Item Component (EIM:VCP EIC) for the current VCP control configuration. The configuration information is provided in the form of the VCP user interface display button title, the associated controlling function key and the EIM:VCP EIC callback method. This information is also built and maintained by the RTC Applications group and is part of the TCID load. An executing EIM sequencer may change the VCP control configuration to match the current test operation. It sends a VCP configuration change request to the VCP EIM who in turn reads the appropriate VCP control configuration from the VCP UI Configuration file. The VCP EIC then sends an even, with the configuration change information, to the CNS VCP user interface display. The new VCP control interface is then displayed to the user.

The user may select from the list of available VCP control configurations (provided as part of the CNS VCP user interface display) to change the VCP control interface. For example, the HMF user may select the VCP for the LOMS bay, where the default VCP is for the FRCS bay.

This VCP design concept and event trace is provided below.

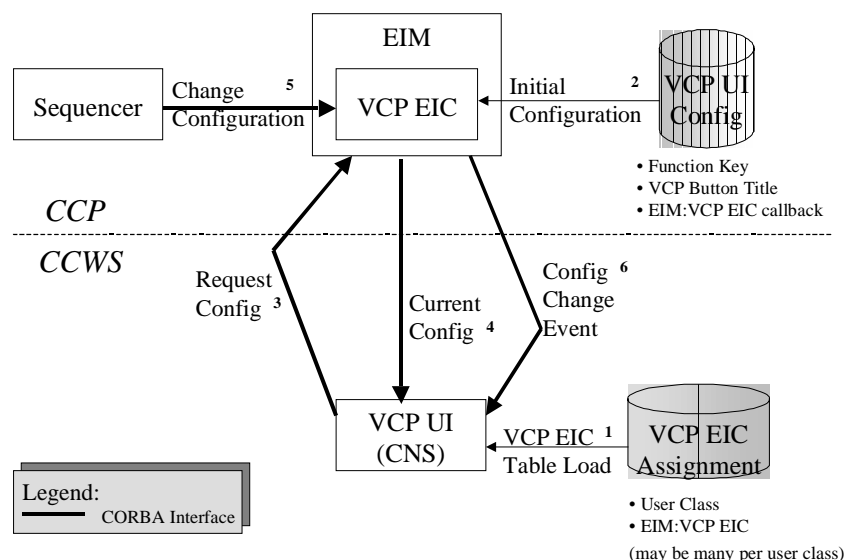


Figure 1.3-4 Virtual Control Panel Design Concept

The event trace:

1. At CNS Virtual Control Panel initialization, the VCP reads the VCP EIC assignment file into memory.
2. At EIM VCP EIC initialization, the initial configuration of the VCP user interface is read into memory.
3. Upon user class assignment/change, the Virtual Control Panel of CNS, attempts to request the current VCP configuration from the corresponding EIM:VCP EIC (found in the memory table). If there is no corresponding memory table EIM:VCP EIC element, then the VCP user class selection menu is grayed out for the user class.
4. The EIM:VCP EIC returns the current VCP user interface configuration and callback assignment(s).
5. An executing EIM sequencer requests the EIM VCP EIC to change the VCP user interface configuration to match the current operation.
6. The EIM VCP EIC sends a VCP user interface configuration change event to the VCP UI. The VCP UI display is updated to reflect the change.

The User Class assignment to the CCWS, as a whole entity, determines the "look and feel" of the CCWS portrayed to the user. The user class assignment indicates the control authority that is authenticated from the CCWS and potentially limits particular user interface display access. An example would be the viewer that provides the RTPS test set load, initialization and termination capabilities, should only be accessible by the CCWS(s) assigned the MASTER user class. The assigned user class also determines the initial configuration of the CNS, HMP and system viewers. The Virtual Control Panel (VCP) defaults to the first assigned application set user class, although the capability is provided to change the VCP. The HMP displays the test application displays, sequencers and end item application status based upon the CCWS assigned user class. Since the assigned CCWS user class may be modified during an operational test, the CNS and HMP must be notified when user class changes occur. The following diagram shows the processes and communication paths involved in CCWS user class assignment. Note that all of these processes execute within the CCWS.

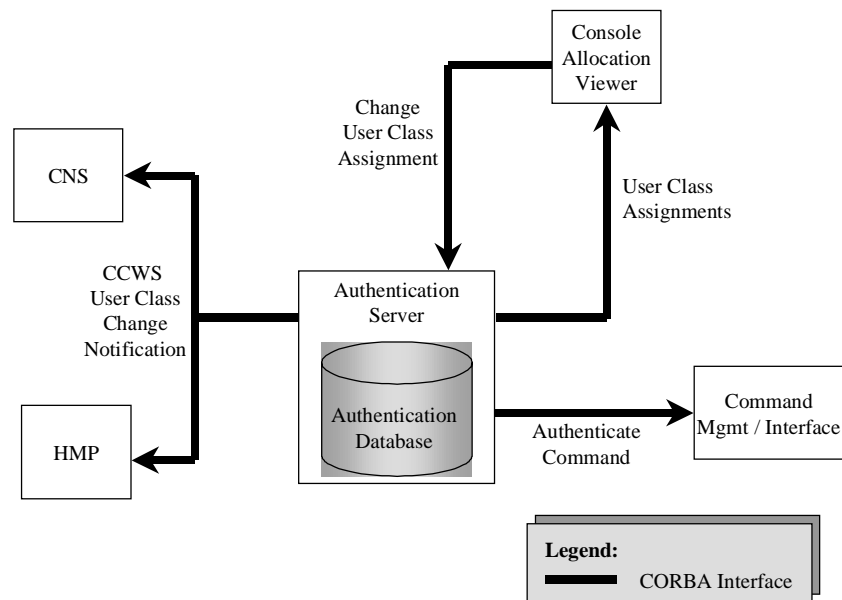


Figure 1.3-5 CCWS User Class Communications

The Authentication Server process encapsulates the authentication database and the methods by which to access and modify the database. By means of the Console Allocation Viewer, an authorized user (Test Conductor), makes user class-to-CCWS assignments. Upon processing the assignment method, the Authentication Server notifies the CNS and HMP of the user class assignment, and provides the modified CCWS assignments back to the Console Allocation Viewer for display. The Authentication Server also provides a method by which to authenticate all commands emanating from the CCWS.

The navigation between windows on the same monitor and across monitors on the CCWS will be defined during the Atlas delivery time frame.

1.3.2 Operational Fault Tolerance/Redundancy Scenario

Upon failure of any of the CCWS processes the CCWS Subsystem Integrity (SSI) should issue a system message describing the failure. A system message should also be issued stating the process' restart status. This restart notification should come from System Services Initiation and Termination Service (ITS) for those processes that it was requested to initiate. A console user, monitoring the system messages, could decide in real time whether or not to save their system, if necessary, and move to a new console position or continue to use the CCWS in a "reduced" capability state (only valid for loss of non-essential processes). Those CCWS processes that are initiated by CNS, via ITS, must periodically send a heartbeat to the CCWS SSI. ITS registers and de-registers all CCWS processes

with the CCWS SSI. Upon normal termination, a process must send a final “heartbeat” to SSI to indicate its’ normal termination state and “de-registration” from SSI.

The following diagram and trace depict this communications flow for the CNS, ITS, SSI, HMP and TADD processes.

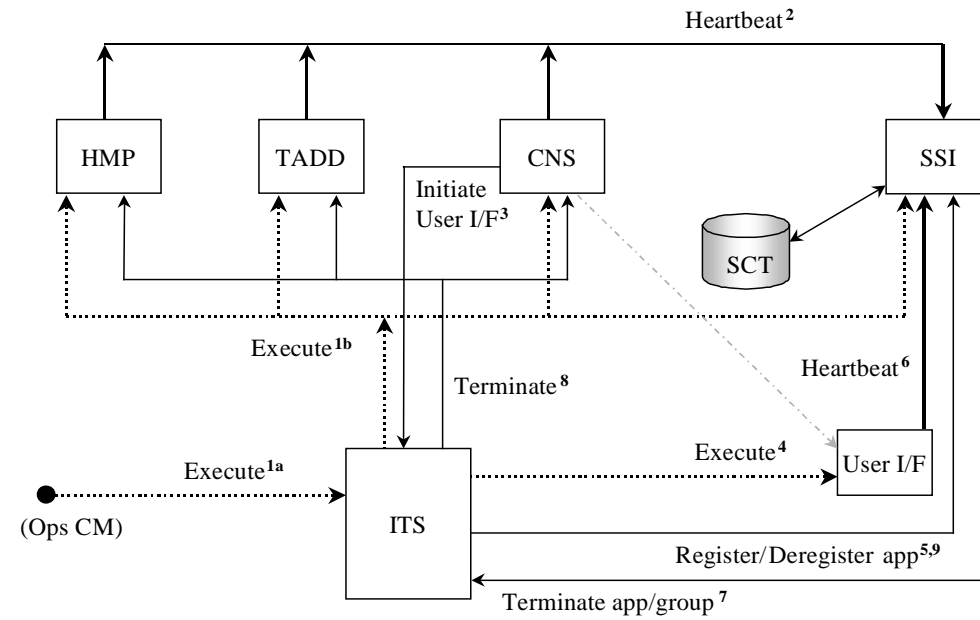


Figure 1.3-6 CCWS Initialization & Termination Communications

The event trace:

1. A) During the CCWS SCID load and initialization phase, Ops CM initiates the CCWS’s Initialization & Termination Service (ITS) application.
B) Ops CM subsequently requests ITS to initiate the Subsystem Integrity (SSI), Control and Navigation System (CNS), HCI Manager Program (HMP) and Test Application Display Driver (TADD) processes.
2. ITS, CNS, HMP and TADD start sending heartbeats to SSI.
3. The CNS requests ITS to initiate selected user interfaces (System Message Viewer, System Status Viewer, etc.).
4. ITS initiates the requested user interfaces.
5. Upon successful user interface initiation, ITS registers the user interface’s execution with SSI. This registration information includes the process name and whether the user interface is essential or non-essential. SSI dynamically assigns an **enumerated** pseudo FD to the process id and adds the process entry to the SCT.
- Note: For Thor 3.0, the CNS will initiate the user interfaces without using ITS. Since the user interfaces are non-essential processes, there is no need to formally register their initiation with SSI.*
6. The initiated user interfaces start sending heartbeats to SSI.
7. Subsystem integrity has been requested to terminate a specific process (via authorized user/process) or a group of applications (via Ops CM to terminate set). SSI requests ITS to terminate the process or group of processes.
8. ITS sends terminate requests to those processes with specific group ids that allows ITS to request termination.
9. Upon successful application termination, ITS de-registers the terminated processes with SSI.

Note: The current design of ITS is to perform a “hard kill” on a process that has not terminated after a period of time. It may be a better design to move this functionality into SSI since it is monitoring every process. Processes must be allowed sufficient time to gracefully terminate. This is especially true of the Real Time Control processes on the CCP and potentially on the CCWS. The termination functionality is not planned for Thor 3.0. However, it will be necessary for Atlas 2.0 to support an operational HMF.

1.4 CCWS PHASE 1 THREAD SPECIFICATION

1.4.1 Statement of Work

Analyze the SLS and "Other Requirements" that are included and provide an assessment in DP1 of:

- Whether the requirement is incorporated into the Atlas release,
- The level of maturity the requirement will achieve in Atlas
 - Low = function only implemented in one subsystem,
 - Medium = function implemented in multiple CSCIs/Subsystems, but capability not available across the entire system,
 - High = function is implemented nearly everywhere, or
 - Complete = function is implemented everywhere that it is needed
- If the requirement will have to be verified for HMF to be declared operational
- Update the Thor Human-Computer interfaces based on:
 - User feedback
 - Human Factors' Usability Study
- Provide Phase 2 enhancements to the System Message Viewer **Atlas 2.0**
 - The SM Viewer shall be able to receive system messages by specifying one or more groups.
 - SM Viewer shall be able to separate system messages by group.
 - SM Viewer shall display system messages graphically, by **group** and time sequence, in a scrollable list provided by the System Message Viewer.
 - SM Viewer shall provide a summary that contains total message count by **group**, severity, and of messages that have been acknowledged by the user for each level of severity.
 - A mechanism will be provided for expanding and collapsing subscription summaries and their associated messages.
 - Multi-level sorts will be supported.
 - SMV, when the viewer window is minimized, will provide a notification mechanism to the user when a new system message has been received.
- Develop Systems Engineering concept on how SDC retrievals should be performed on a CCWS and provide a System Message Retrieval prototype [HMF] **Atlas 2.0**
- Provide the Control Navigation System(CNS) capabilities: [HMF]
 - Primary window (1st monitor) **Thor 3.0**
 - Secondary window (2nd monitor) **Atlas 2.0**
 - To run, start, and shutdown CCWS "window" applications(window management and navigation) **Thor 3.0**
 - Virtual Control Panel (VCP) **Thor 3.0**
 - Definition and development of APIs for Real Time Control applications to interact with the VCP **Thor 3.0**
 - Display of the CNS header information which includes the Test Activity information, CCWS assigned User Class(es), Gateway summary, Data Distribution "alive" indicator **Thor 3.0**

- User interface to print the entire CRT screen, in context **Thor 3.0**
- Provide a generic viewer/GUI capability to print the active display window, in context **Thor 3.0**
 - Addition of print “activity data” header **Atlas 2.0**
- Provide plot capabilities for the: **Thor 3.0**
 - Generation of real-time plots with capability to pre-pend plot with a maximum of 1 hour of historical test data
 - Definition and development of APIs for Real Time Control applications to initiate real-time plots
- Provide the APIs for Real Time Control applications to setup the Display Monitor FDs. [HMF] **Atlas 2.0**
- Initiate the Subsystem Engineering Package for this subsystem. The outline of the sections for Atlas delivery include: **Atlas 1.0**
 - Overview
 - Hardware Architecture
 - Subassembly drawing and parts list
 - Setup / altered item procedures for configuring COTS equipment
 - Procurement specifications and related statement of work information
 - Requirements documents / specifications
 - Receiving Inspection Procedure (RIP), for accepting procured hardware
 - Hardware Selection Review (HSR)
 - Hardware Requirements Verification Test (HVRT)
 - Operations and Maintenance Manuals / User guides
 - Interim Maintenance Support
 - Insight and OJT to technicians and manufacturing personnel
 - Software Architecture
 - Operational Scenarios
 - Boot Up
 - Test Load and Configuration
 - Window Navigation and Management
- Develop and prototype a FD Server (utilizing a Corba IDL interface) to support FD data (excluding queued FD data) and possibly command requests from Java and C++ applications. **Thor 3.0**. Pending prototype acceptance, deliver a released FD Server for **Atlas 2.0**.
- Enhance FD Details Viewer to provide:
 - The CCMS Status CCT (LDB/UPLK) capability **Atlas 2.0/Post Atlas**
 - The following FD types: (Note: FD data presentation is released in **Thor3.0**. Command capability is potentially prototyped for **Thor 3.0** and released in **Atlas 2.0**)

- Enumeration **Thor 3.0**
- Strings **Thor 3.0**
- GSE Analog Measurement **Thor 3.0**
- GSE Analog Stimulus **Thor 3.0**
- GSE Discrete Measurement **Thor 3.0**
- GSE Discrete Stimulus **Thor 3.0**
- GSE Digital Pattern Measurement **Thor 3.0**
- GSE Digital Pattern Stimulus **Thor 3.0**
- GSE Linearization Curve Status **Thor 3.0**
- System/Pseudo Status **Thor 3.0**
- LDB Analog Measurement **Atlas 2.0**
- LDB Analog Stimulus **Atlas 2.0**
- LDB Discrete Measurement **Atlas 2.0**
- LDB Discrete Stimulus **Atlas 2.0**
- LDB Digital Pattern Measurement **Atlas 2.0**
- LDB Digital Pattern Stimulus **Atlas 2.0**
- LDB Request ID Keyword Status **Atlas 2.0**
- PCM Analog Measurement **Atlas 2.0**
- PCM Discrete Measurement **Atlas 2.0**
- PCM Digital Pattern Measurement **Atlas 2.0**
- PCM Analog Double Precision Measurement **Atlas 2.0**
- PCM Multiword Digital Pattern Measurement **Atlas 2.0**
- PCM GPC Floating Point Analog Measurement **Atlas 2.0**
- PCM Time Homogeneous Data Set Status **Atlas 2.0**
- BTU Status **Atlas 2.0**
- *UPLK Discrete Stimulus **Post Atlas***
- *UPLK Digital Pattern Stimulus **Post Atlas***
- *UPLK Request ID Keyword Status **Post Atlas***
- *TMDS Discrete Stimulus **Post Atlas***
- *UCS Analog Measurement **Post Atlas***
- *UCS Discrete Measurement **Post Atlas***
- *UCS Discrete Stimulus **Post Atlas***
- Field size modifications for FD nomenclature (100 chars) and FD name (20 chars) **Thor 3.0/Atlas 2.0**
- Subsystem Integrity shall provide it's heartbeat API for both JAVA and C/C++ applications [HMF] **Thor 3.0**

- Initialization and Termination Services shall provide it's initiate/terminate application API(s) for both JAVA and C/C++ applications [HMF] **Thor 3.0**
- Queued FD Service shall provide a means to signal the requesting C/C++ application when new data is made available on the queue [HMF] **Thor 3.0**
- Command Authentication Server shall provide a CORBA IDL interface and implementation to support [HMF]: **Atlas 2.0**
 - User class change notification to the CNS and the HMP
 - Modifications to the user class repository from the Console Allocation Viewer
 - Queries of the current user class repository elements from the Console Allocation Viewer
- Develop CCWS user interface display support for:
 - User Class assignment and monitoring (Console Allocation Viewer) **Atlas 2.0**
 - RTPS equivalent capability for installation, load and initialization, termination, software patches/updates (INST, CLAI, TERM, UPDATE) **Atlas 2.0**
 - GMEM Read (GPCC LDBA, LDBD) **Atlas 2.0**
 - Switch Scan Command (SWSCAN) **Atlas 2.0**
 - Read Onboard Commands (READ FD, BTU) **Atlas 2.0**
 - LDB Control (GPCC LDBC) **Atlas 2.0**
 - PVO for Time Homogeneous Data Set **Atlas 2.0**
 - Read SIO MTU Device (READ MTU) **Atlas 2.0**
 - *GMEM Write (GPCC LDBA, LDBD, UPLK) **Post Atlas***
 - *Command Payload (CPLD) **Post Atlas***
 - *Read SIO Devices (READ StarTracker, IMU, EIU, TACAN, MSBLS, ADTA, GPS) (TBD – may be a RTC application delivery item) **Post Atlas***
 - *Explicitly Coded Program Commands (GPCC NAME, CCD, RFG, FRT, MAT, BFD, BFM, ACTI) **Post Atlas***
 - *SSME Read/Write Mem (SSME) (TBD – may be a RTC application delivery item) **Post Atlas***
 - *Dump/Load Onboard Registers (LDREG, DPREG) (TBD – may be a RTC application delivery item) **Post Atlas***
 - *T-20 Minute Patch (\$PT20) (TBD – may be a RTC application delivery item) **Post Atlas***
 - *Orbital Computational Facility Commands (OCFI) (TBD – may be a RTC application delivery item) **Post Atlas***

1.4.2 Requirements

System Message Viewer

- (SLS 2.2.4.2.2) The RTPS shall allow users to register for and receive System Messages for a requested Message Group and Severity. [Atlas,]
- (SLS 2.2.4.2.6) The System Message Viewer shall provide an audible warning capability. [Atlas,]

- (SLS 2.2.4.2.7) The System Message Viewer shall provide the capability to filter messages as requested by the user. [Atlas,]
- (SLS 2.2.9.2.10) The RTPS shall provide a central point for the display of system error, status, and mode change messages. [Atlas,]

Display Navigation and Management

- (SLS 2.2.5.8.10) The RTPS User Display function shall provide the capability to initiate other displays. [Atlas,]

Virtual Control Panel

- (SLS 2.2.12.4.1) The Command Panel shall provide the Safing functionality of the CCMS Programmable Function Panel (PFP). []
- (SLS 2.2.12.4.2) The CLCS shall provide a clear and unambiguous association between the Command Panel actions and the functions provided by the Command Panel. []

Display Monitor Viewer

- (SLS 2.2.4.3.9) The RTPS shall provide a Display Monitor Viewer which provides a mechanism for asserting and viewing information for selected measurement FDs for Display Monitor purposes only. [Atlas,]
- (SLS 2.2.4.3.10) The Display Monitor Viewer shall periodically update the displayed Measurement FD information. [Atlas,]
- (SLS 2.2.4.3.11) The RTPS shall provide the capability for user test applications to setup the Constraint Monitor and Display Monitor Viewers' FDs. [Atlas,]

Plot Capability

- (SLS 2.2.5.8.4) The CLCS shall provide the capability to plot data from both real time acquisition of the data and data retrieved from the recording media (a maximum of 1 hour recorded test data) to the Command and Control Workstation CRT. [Atlas,]
- (SLS 2.2.10.2.2) The CLCS shall provide the capability to display and plot data retrieved from the SDC. [Atlas,]

Print Screen and Window Capability

- (SLS 2.2.2.2.9) Screen capture (for screen printing, etc.) shall take less than 0.5 seconds from initiation until the user can control/change the display. [Atlas,]
- (SLS 2.2.2.2.10) Screen print shall take less than ten seconds to a local B&W printer. []
- (SLS 2.2.4.4.1) The RTPS shall provide the capability to capture still images from the CCWS screen (on request) and view, print, transfer to another computer, record, or save for later use. [Atlas,] **Requires clarification.**
- (SLS 2.2.12.7.2) The CLCS shall provide the capability to spool output from any Console Position to any of the output devices in the Shared I/O Area in that OCR. []

FD Details Viewer

- (SLS 2.2.4.3.2) The RTPS shall provide a FD Viewer which provides a mechanism for viewing all available information about any RTPS FD. [Atlas,]
- (SLS 2.2.4.3.3) The FD Viewer shall be linkable to user and system displays. [Atlas,] **Requires Clarification.**
- (SLS 2.2.4.3.4) The FD Viewer shall provide a mechanism for viewing all available information about any measurement FD's Health. [Atlas,]
- (SLS 2.2.4.3.5) The FD Viewer shall provide a mechanism for viewing all available information about a Fused FD. [Atlas,]

- (SLS 2.2.4.3.6) The FD Viewer shall provide a mechanism for viewing information about constraints asserted against a specific measurement FD. [Atlas,]
- (SLS 2.2.4.3.7) The FD Viewer shall update the information displayed when the window is selected by the user. [Atlas,]
- (SLS 2.2.4.3.12) The FD viewer shall provide a mechanism for initiating a retrieval for the selected FD. [Atlas,] **Requires Clarification.**
- (SLS 2.2.5.8.3) The CLCS shall provide the capability to display the current value of a measurement and all data related to the measurement. [Atlas,]
- (SLS 2.2.5.8.6) The RTPS User Display function shall provide the capability to read and display information derived from FDs. [Atlas,]
- (SLS 2.2.5.8.7) The RTPS User Display function shall provide the capability to issue commands to FDs by cursor control regardless of whether there is a End-Item Manager controlling the FDs or not. [Atlas,]

General SLS Requirements

- (SLS 2.2.1.1.4) The RTPS shall provide fault tolerance in the Command and Control ~~Workstations~~**HCI positions.** [Atlas,]

Rationale: The same level of fault tolerance is not provided in the Command and Control ~~Workstations~~**HCI positions** as in other areas of the RTPS design. These positions will be connected to the DCN such that a DCN failure will still allow approximately half of the workstations to remain operational. A workstation or network adapter failure will require another workstation to be used.
- (SLS 2.2.2.1.14) The system shall support executing a manual command in less than one second from human execution to RTPS interface output. [Atlas,] **Requires clarification.**
- (SLS 2.2.2.2.6) The Display function shall, for a single workstation, support updating of 250 displayed FDs out of 500 in one second in a single window. [Atlas,]
- (SLS 2.2.2.2.7) The Display function shall, for a single workstation, support updating 50% of the FD's every second on 13 windows with 100 FD's in each window. [Atlas,]
- (SLS 2.2.2.2.8) The system shall, for a single workstation, display a new graphical screen with up to 500 FDs in 250 milliseconds when the screen (active but not displayed) is selected for viewing. [Atlas,]
- (SLS 2.2.4.2.8) All Developed System and Application Software shall use the System Message capability for messages. [Atlas,]
- (SLS 2.2.4.3.1) The RTPS shall provide a set of System Viewers which provide selected data for display without requiring the user to develop a specific display. [Atlas,]
- (SLS 2.2.5.2.4) Users and system and user application shall have the capability to view health and status information on individual and groups of measurements. [Atlas,]
- (SLS 2.2.5.2.8) RTPS Measurement FD Health shall include the capability for manual input by engineering personnel. [Atlas,]
- (SLS 2.2.5.8.1) The CLCS shall provide the capability to monitor all measurement data available to the test set. [Atlas,]
- (SLS 2.2.12.3.1) Displays and controls shall follow the user interface guidelines specified in the CLCS HCI Guidelines and Standards (~~84K00230, HCI Style Guide and Standards~~**DOC#—TBD**) [Atlas,]

1.5 CCWS PHASE 1 THREAD HARDWARE DIAGRAM

The CCWS hardware provides a common computer platform for the System and Real Time Control application software defined in Section 1.2. Figure 1.5.1 depicts an overview of the CCWS hardware. Refer to document 84K02501, Platform Requirements for CLCS Command and Control Workstation, for details.

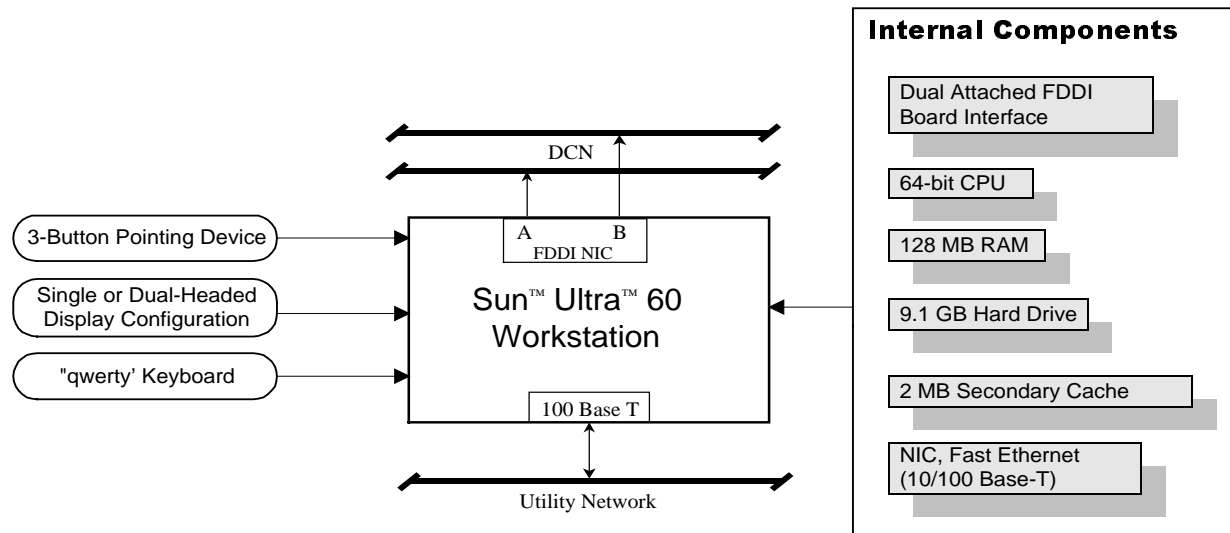


Figure 1.5.1 CCWS HW Diagram

The CCWS hardware components consist of:

- a single, detachable keyboard
- a single, detachable three-button mouse
- a dual head CRT / Flat Panel display configuration at all SE consoles
- a single CRT / Flat Panel Display at selected console support modules and development environments
- graphics processor(s) with a min. resolution of 1280 x 1024 pixels
- a 64-bit CPU with a. clock frequency of 300 MHz.
- 128 MB of RAM
- 9.1 GB disk drive
- dual attached FDDI Interface board that is compatible with the DCN network
- 2 RS-232 or RS-422 Interface ports, in addition to the one for the pointing device
- a 100 Base-T utility network interface

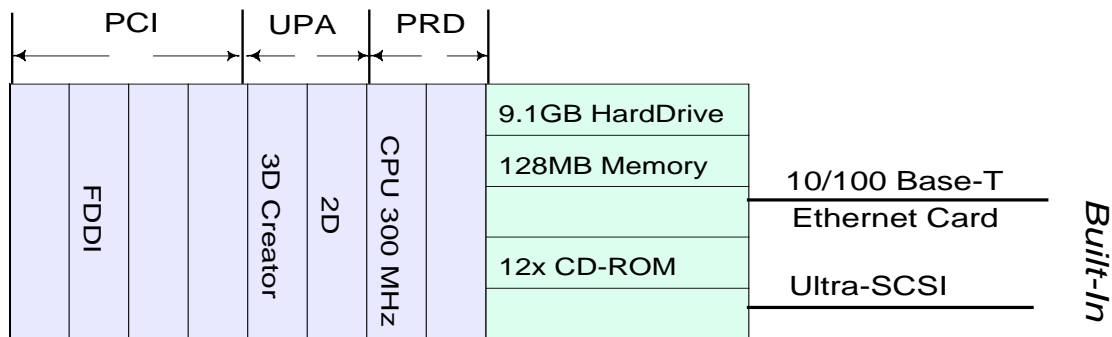


Figure 1.5.2 CCWS Component Layout

1.6 CCWS PHASE 1 THREAD DELIVERABLES

Software:

Deliverable	R&D Document	Code	API Manual	Users Guide
System Viewers	X	X	X	X
Common Application Support		X		.man pages
Subsystem Integrity	X	X	X	
Initialization and Termination Services	X	X	X	
IPC (CORBA)	X	X		
Application Services	X	X	X	X

Hardware:

Deliverable	R&D Document	Drawings	Prototype	Users Guide
CCWS		X		X

Interface Description Document:

IDD Names	Responsible CI	Supporting CI
CCWS to CCP	DCN	CCWS
DDP to CCWS	DCN	CCWS
Boot Server to CCWS	Utilities Network	CCWS
CCWS to Control Room Peripherals	Utilities Network	CCWS
UDS/FDS/SSS	ASV	System Viewers

Other:

CCWS System Engineering Document
System Message Retrieval Prototype Demo
Human Factors Usability Report
CCWS Retrieval/Viewer White Paper
CCWS Viewer Performance Report

1.7 CCWS PHASE 1 THREAD ASSESSMENT SUMMARY

This section contains the summary of the costs and labor involved in implementing the capability. It is broken into three sections. The first is a summary of the individual CI (CSCI and HWCI) labor assessments. The second is a summary of hardware costs. The third is a summary of procurement activities needed.

1.7.1 Labor Assessments

The total Labor Costs required to provide these capabilities are summarized in the following table;

No.	CSCI/HWCI Name	Atlas LM	Changes covered in
1	Virtual Control Panel API RTC Apps Integration	0.75	
2	Human Factors Usability Report	1.00	
3	CCWS Retrieval Concept White Paper	0.00	Assigned to Tom Beaver
4	CCWS Viewer Performance Report	1.00	
5	Sys Message Retrieval Viewer Prototype	5.00	
6	System Viewers	30.00	
7	Common App Support	2.00	
8	System Services	4.00	Will increase with new print features
9	App Services	18.00	
10	System Viewers – Console Allocation	0.00	Commanding & Cmd Processor Thread
11	Cmd Mgmt – Cmd Authentication Server	0.00	Commanding & Cmd Processor Thread
12	Cmd Mgmt – User Interfaces <ul style="list-style-type: none"> • GMEM Read • Switch Scan • Read Onboard Cmds • LDB Control • PVO for THDS • Read SIO MTU 	0.00	Commanding & Cmd Processor Thread
13	Sys Ctrl – Ops CM User Interfaces <ul style="list-style-type: none"> • Set Installation • Set Load & Init • Set Terminate 	0.00	System Control Thread
14	Subsystem Integrity	3.00	
15	CCWS HWCI	7.75	
	TOTAL	72.50	

1.7.2 Hardware Costs

The total Hardware Costs required to provide this capability are summarized in the following table:

Item number	Name	Unit Cost	Qty.	Total	Assumptions
1	CCWS Hardware	\$10,000	88	\$880,000.00	Single vendor part number will completely describe CCWS configuration
2	Flat Panel Displays	\$6,000	55	330,000.00	Provided by 3 rd Party vendor
Total:		143		\$1,210,000.00	

1.7.3 CCWS PHASE 1 THREAD Procurement

Procurement Activity	Completion Date
Define CCWS Platform Requirements	2/11/98
Select CCWS Platform Vendor	3/98
Determine Specific CCWS Configuration	3/27/98
Order CCWS Hardware via SEWP II	5/1/98 – Order each quarter; arrive within 60 days
COTS Software (Corba,)	5/1/98
COTS C++ Runtime Error Checking Tool(s) (Visual Workshop, Java Workshop)	

1.8 CCWS PHASE 1 THREAD SCHEDULE & DEPENDENCIES

1.8.1 Schedule

Task Name	Start	Finish
Thor3.0/Atlas Concept Phase	2/02/98	
Concept Panel Internal Review	2/24/98	3/7/98
Concept Panel	3/14/98	3/14/98
Thor3.0/Atlas Development		
Requirement Panel Internal Review	5/21/98	
Requirement Panel		10/06/98
Design Panel Internal Review	06/09/98	
Design Panel		10/29/98
CSCI Unit Testing		
Hardware Selection Review	8/10/98	8/14/98
Development Integration Test		
CSCI Integration Test		
Support System Integration Test		
Atlas Development Complete		12/18/98

1.8.2 Dependencies

This section lists dependencies that the thread has in order to be satisfactorily specified, designed, implemented, or tested.

No.	Dependency Area	Dependency	Need Date
1	HSR	Subassy. drawing., Setup/Installation, Procurement Specs and SOW info., RIP	4/98
2	Platform Procurement	Platform Selection	4/98
3	Hardware on Dock	P.O. Issued by NASA procurement	6/15/98

1.9 CCWS PHASE 1 THREAD SIMULATION REQUIREMENTS

Math Models providing GSE, PCM D/L, LDB and BTU data and functions.

Physical links to SGOS/VSI

Physical links to HMF, SDE, IDE

1.9.1 CCWS PHASE 1 THREAD Integration and System Test Plan

CIT Test

TCID Required: For Thor 3.0 CIT, any validation CLCS TCID that contains enumeration, string and GS2A FD types. The Virtual Control Panel EIC Assignment Table is required as part of the TCID.

For Atlas 2.0 CIT, any validation CLCS TCID that contains LDB, PCM and BTU FD types, in addition to the Thor 3.0 FD types. The VCP EIC Assignment Table and VCP UI Configuration Table are both required as part of the TCID.

System Resources Required: **Thor 3.0:** SDE2, IDE, CCWS, CCP, DDP, GS2A Gateway

Atlas 2.0: SDE (for Atlas 2.0 : with dual-headed CCWS), IDE (for Atlas 2.0 : with dual-headed CCWS), CCWS (Atlas 2.0 requires a dual-headed CCWS), CCP, DDP, GS1A and GS2A Gateways, LDB Gateway and PCM D/L Gateways

CSCI/CSCs required: System Viewers, Application Services, Command Support, Data Distribution & Processing, System Control, System Services, Common Application Support, Common Gateway Services, GSE Services, LDB Services, PCM D/L Gateway Services

Additional Data Requirements: System Configuration Table

Test tools:

Test plan:

- Ops CM will initiate a CCWS. In doing so, it will execute the ITS, HMP, TADD, CNS and SSI processes.
- SSI will monitor the heartbeats provided by the HMP, CNS, and TADD.
- CNS should show the current activity information, GMT/CDT, and data distribution status in it's banner area.
- The user will initiate the System Status Viewer, via the CNS icon. The status of the HMP, CNS, and TADD should be apparent on the System Status Viewer display.
- The user will then initiate the System Message Viewer, Console Allocation Viewer and FD Details Viewer from the CNS primary window. The System Status Viewer should reflect the status display of these applications.
- The CCWS is assigned the HMF user class using the Console Allocation Viewer. The CNS and HMP should reflect the HMF user class assignment in their respective window displays. The VCP should reflect the default HMF EIC assignments. **Atlas 2.0: Change the user class of the CCWS using the Console Allocation Viewer. Verify appropriate changes to the CNS, HMP and VCP. Add 2 additional user classes to the CCWS. Verify appropriate changes to the CNS, HMP and VCP.**

- The user will initiate the FD Details Viewer from CNS. From the FD Details Viewer cycle through the SOW FD types called out for the FD Details Viewer. Ensure appropriate data displayed for the FD type. Initiate the print window capability for 2 of the FD Details displays.
- The user will initiate a plot from the FD Details Viewer and initiate the print window capability for the plot window.
- The user will initiate a print window for the System Message Viewer.
- The user will initiate a print for the entire CRT screen.
- The user will initiate a plot from a EIM Sequencer.

In addition to above, for the Atlas 2.0 release also perform the following:

- Perform the above steps from the CNS secondary CRT screen. Ensure the appropriate displays for the secondary CRT screen.
- In the System Message Viewer, cycle through the group capabilities spelled out in the SOW.
- The user will initiate the print window capability for the System Message Viewer. Verify the addition of activity information header on the printout.
- The DMON viewer will be initiated from a EIM Sequencer.
- Cycle the FD Details Viewer through the SOW items for the FD types for data display and command capabilities.

System Test

TCID Required: Thor 3.0 CIT: any validation CLCS TCID that contains enumeration, string and GS2A FD types. The Virtual Control Panel EIC Assignment Table is required as part of the TCID.

Atlas 2.0 CIT: any validation CLCS TCID that contains LDB, PCM and BTU FD types, in addition to the Thor 3.0 FD types. The VCP EIC Assignment Table and VCP UI Configuration Table are both required as part of the TCID.

System Resources Required: Thor 3.0: HMF, CCWS, CCP, DDP, GS2A Gateway

Atlas 2.0: IDE (for Atlas 2.0 : with dual-headed CCWS), CCWS (Atlas 2.0 requires a dual-headed CCWS), CCP, DDP, GS1A and GS2A Gateways, LDB Gateway and PCM D/L Gateways

CSCI/CSCs required: System Viewers, Application Services, Command Support, Data Distribution & Processing, System Control, System Services, Common Application Support, Common Gateway Services, GSE Services, LDB Services, PCM D/L Gateway Services

Additional Data Requirements: System Configuration Table

Test tools:

Test plan:

Thor 3.0: The CIT test steps are performed on the HMF set while executing a pre-selected HMF OMI

Atlas 2.0: The CIT test steps are performed on the IDE set.

1.10 CCWS PHASE 1 THREAD TRAINING REQUIREMENTS

1.10.1 Training Needed

Java training required for 8 CLCS personnel:

- 3 Viewer programmers
- 4 Retrieval programmers
- 1 System Engineer

CCWS operations training for Operations/Test Engineering personnel:

- 15 HMF personnel

Hardware familiarization training required:

Sparc/Ultra Desktop Systems Maintenance (SM-210)

- 1 Subsystem Engineer in June 1998

Detailed Hardware training required:

- 2 Subsystem Engineers

Operating System training required:

Solaris 2.x Essentials for System Maintainers (SM-101)

- 1 Subsystem Engineer in May 1998

1.10.2 Training to be provided

The HW Subsystem Engineers participating in the vendor training listed above will then train fellow HW Subsystem Engineers in the following topics:

Hardware familiarization
Detailed Hardware training
Operating System training

1.11 CCWS PHASE 1 THREAD FACILITIES REQUIREMENTS

To support CNS development, testing and integration, at least one dual monitor CCWS is required to be integrated into the IDE and SDE sets.

IDE

1. Install and integrate into the set, a dual monitor CCWS (selected Sun platform)

SDE

1. Install and integrate into the set, a dual monitor CCWS (selected Sun platform)

To support System testing of the CCWS operational capabilities, the HMF test set must be fully functional.

HMF

1. A fully functional test set with dual monitor CCWSs (selected Sun platform)

1.12 TRAVEL REQUIREMENTS

This section contains a list of travel requirements.

From	To	Reason	No. People	Duration	Est. Date or Frequency
TBD	TBD	Visit CCWS Vendor on-site (Longwood or Melbourne)	2	8 hrs.	4 times / Month
KSC	Baltimore	Training: SM-101	1	5 Days	May 4
KSC	Baltimore	Training: SM-210B	1	5 Days	May 11

1.13 CCWS PHASE 1 THREAD ACTION ITEMS/RESOLUTION

1. JAVA training was not among the list of approved training classes for FY98. Java training was placed on the list of approved training classes following the internal DP1. A list of personnel requiring Java training, in support of this thread, was emailed to Larry Wilhelm. Class is scheduled for week of June 15th.

2. The availability of operational CCWS hardware is critical to design and development of the CNS secondary window.
3. Need to ensure that all CCWS requirements required for the operational HMF and the development/validation of post-Atlas RTC IPT applications are addressed in the Atlas threads.
4. Is there a training plan for CCWS Operations? Who will teach it? The CLCS Training Plan, 84K00060, doesn't address CCWS training until Sept/Oct 1999. Liz Foley has been contacted concerning the HMF CCWS operational training required at the end of the Atlas delivery. Liz is coordinating the necessary paper trail to advance the CCWS training to support the Atlas delivery.
5. What is the scope of the CCWS? For Atlas, the scope is the CCWS located in the control room environments (OCRs and specialized sites).
6. What is meant by CCWS operational for HMF? CCP and DDP subsystems would also need to be operational. Is a FMEA required for declaring the CCWS operational?

2. CSCI ASSESSMENTS

This section is provided for the individual CSCI lead to fill in and provide the details of their assessments.

2.1 SYSTEM VIEWERS ASSESSMENT

System Viewers Work Required

System Message Viewer

Will provide a technique to offer subscription filtering, multilevel sorting, an icon notification system, help system, and expandable/collapsible message structure.

Java Performance Study

Compose a white paper describing Java performance on SGI and Sun platforms. This paper will compare performance with and without using the Java compiler and the affect of CORBA on Java performance.

Plot Viewer

The Plot Viewer CSC will provide the interface between the SL-GMS Plot widget and data distribution. CLCS "look-and-feel" will be incorporated into Plot widget.

CNS

Provide Console Navigation System capabilities. CNS will run with one or two monitors. The Virtual Control Panel (VCP) will be part of CNS. CNS will display information, which includes the Test Activity, assigned User Classes, Gateway information, Data Distribution information (e.g. "alive"). CNS will define and develop APIs for applications to interact with the VCP. CNS will interface with ITS to initiate and terminate applications.

HMP

The Human Computer Interface Manager Program (HMP) is a single point interface for selecting which Test Application Displays and Sequencers the user wants to perform and for providing a list of all active Test Application Displays and Sequencers the user has started. An interface for viewing the status of and controlling the End Item Managers associated with the CCWS assigned User Class(es) is also provided.

TADD

The Test Application Display Driver (TADD) provides the background intelligence for the SL-GMS Test Application Displays. This program is required for any Test Application Display execution. The TADD is also responsible for interfacing with and controlling the SL-GMS Plot Widget (from the Common Application Support CSCI) used on both the Plot Viewer and Test Application Displays.

DMON

Provide application APIs to DMON

FD Viewer

Will define and develop commanding user interface that will become part of the FD details Viewer. The commanding FD will be displayed in the FD details Viewer and the user will have the option to issue the command. An estimated thirty command displays will be developed. All System Viewers will be “published” in book form. This effort will complete early so users and CLCS may check for information content.

CSCI Assessment

CSC Name	CSC Labor (LM)	% of CSC
System Message Viewer	4	
Java Performance Study	1	
Plot Viewer	2	
CNS	6	
HMP	3	
TADD	4	
DMON	1	
FD Viewer	10	

Basis of estimate

The number of displays and degree of difficulty for displays were used to arrive at Viewer estimates.

Documentation

Document Type	New/Update	Number of Pages
Requirements and Design Documentation	Update	TBD
Users Guide	Update	TBD
API Interface Document		
Interface Design Document	N/A	
Test Procedure	Update	TBD

Assumptions

The SL-GMS Technical representative will support the RTC Applications group in designing and developing the TADD functionality to interface to and control the SL-GMS plot widget (Common Application Support CSCI).

Open Issues

None at this time.

COTS Product Dependency List

Product Name	Quantity Needed	Need Date

2.2 SYSTEM SERVICES CSCI ASSESSMENT

The System Services CSCI will provide updates to support the CCWS Phase 1 Thread. SSV will provide enhancements to the CORBA Authentication interceptors. It will also provide a CORBA interface to the ITS CSC.

IPC (CORBA) CSC Work Required

Timer Services will provide enhancements to the Thor implementation of CORBA authentication as required by the interface to command authentication.

Initialization and Termination CSC Work Required

ITS will perform the following work in support of this thread:

1. Add a CORBA interface to ITS so that JAVA applications may use the services without the JAVA bridge.

Utility Services CSC Work Required

Utility Services will provide enhancements to the print capability to add activity header info for window prints. Enhancements to provide plot prints for color and black and white printers.

CSCI Assessment

CSC Name	CSC Labor (LM)	% of CSC
Utility Services (Print)		
IPC (CORBA)	1.5	100%
ITS	2.5	100%

Basis of estimate

This estimate is based on the previous experience with implementing CORBA functions.

Documentation

Document Type	New/Update	Number of Pages
Utility Services		
Requirements and Design Documentation	Update	
Test Procedure	Update	
IPC (CORBA)		
Requirements and Design Documentation	Update	2
Test Procedure	Update	8
ITS		
Requirements and Design Documentation	Update	2
API Manual	Update	15
Test Procedure	Update	8

Assumptions

None.

Open Issues

None.

COTS Product Dependency List

Product Name	Quantity Needed	Need Date
None		

2.3 APPLICATION SERVICES CSCI ASSESSMENT

Application Services Work Required

CNS

Provide FD information and support for the Console Navigation System. Provide Java APIs for C++ system services APIs.

FD Details

Assist in FD Commands provided for FD Viewer. Develop and design a concept of which commands will be done from FD Details. Provide Java wrappers to C++ FD objects. Investigate CORBA wrappers for sending packet data back. Provide support for any FD types that are required but not supported.

Plot Viewer

Provide enhance Q'd FD to specify update rates and quantity to Q'd services.

Java Support

Analyze and design a CORBA alternative to Java wrappers.

OLDB

Provide OLDB APIs for data length changes, new fields, and new format.

System Integrity

Provide Java heart beat wrappers for Java applications.

CSCI Assessment

CSC Name	CSC Labor (LM)	% of CSC
UDS	12	
FDS	3	
SSS	3	

Basis of estimate

The number of lines of code, the amount of Java code to wrap, UDS re-design and analysis.

Documentation

Document Type	New/Update	Number of Pages
Requirements and Design Document	Update	
API Interface Document	Update	
Interface Design Document	Update	
Test Procedures	Update	

Assumptions

Provide and support a very limited amount of FD commands for FD Details.

Open Issues

Amount of Commanding that will be done from Viewers.

COTS Product Dependency List

Product Name	Quantity Needed	Need Date

2.4 COMMON APPLICATION SUPPORT CSCI ASSESSMENT

A generic SL-GMSTM plot sub-model will be developed to support the system Plot Viewer and Test Application Display plot requirements.

SL- GMSTM Components CSC Work Required

Develop a generic SL-GMSTM plot sub-model.

CSCI Assessment

CSC Name	CSC Labor (LM)	% of CSC
SL-GMS Plot Widget	2	

Basis of estimate

This estimate is based on the previous experience with implementing SL-GMS functions.

Documentation

Document Type	New/Update	Number of Pages
.man pages	New	

Assumptions

The SL-GMS Technical representative will support the RTC Applications group in designing and developing the plot widget.

Open Issues

COTS Product Dependency List

Product Name	Quantity Needed	Need Date

3. HWCI ASSESSMENTS

This section is provided for the individual HWCI lead to fill in and provide the details of their assessments.

3.1 HWCI CCWS ASSESSMENT

The following is an assessment of the hardware and associated documentation required for the Atlas delivery.

Work Required

- Subassembly drawing and parts list
- Setup / altered item procedures for configuring COTS equipment
- Procurement specifications and related statement of work information
- Requirements documents / specifications
- Receiving Inspection Procedure (RIP), for accepting procured hardware
- Hardware Selection Review (HSR)
- Hardware Requirements Verification Test (HVRT)¹
- Operations and Maintenance Manuals / User guides²
- Interim Maintenance Support
- Provide insight and OJT to technicians and manufacturing personnel²

¹ Work started, but not completed, during Atlas

² Post-Atlas work.

HWCI Assessment

This section contains a list of the kinds and amount of labor and equipment necessary to provide the capability.

Labor

HWCI Name	HWCI Labor (LM)	% of HWCI
Subassembly Drawing/Parts List	1 LM	10 %
Procurement Spec and related SOW info	0.5 LM	5 %
Receiving Inspection Proc (RIP)	0.25 LM	2.5 %
Hardware Req. Verif. Test (HVRT)	3 LM	30 %
Operations/Maintenance Manuals, User Guides	1 LM	10 %
OJT to tech's and manuf. personnel	1 LM	10 %
Other	3.35 LM	33.5%

Equipment

Equipment Type	Quantity	Unit Cost Estimate	Total Cost
CCWS Hardware	88	\$10,000	\$880,000.00
Flat Panel Displays	55	\$6,000	330,000.00
Total			\$1,210,000.00

Documentation

Document Type	New/Update	Number of Pages
Subassembly Drawing/Parts List		
Procurement Spec and related SOW info		
Receiving Inspection Proc (RIP)		
Hardware Req. Verif. Test (HVRT)		
Operations/Maintenance Manuals, User Guides		

Assumptions

None.

Open Issues

None.

HW Products Dependency List

Product Name	Quantity Needed	Need Date
HSR	Subassy. drawing., Setup/Installation, Procurement Specs and SOW info., RIP	4/98
Platform Procurement	Platform Selection	4/98
Hardware on Dock	P.O. Issued by NASA procurement	6/15/98